NOMINATING PARTY: The United States of America

FILE NAME: USA CUN14 SOIL STRAWBERRY FRUIT Open Field

BRIEF DESCRIPTIVE TITLE OF NOMINATION:
Methyl Bromide Critical Use Nomination for Preplant Soil Use for Strawberry Fruit Grown in Open Fields (Submitted in 2012 for the 2014 Use Season)

CROP NAME (OPEN FIELD OR PROTECTED): Strawberry Fruit Open Field

QUANTITY OF METHYL BROMIDE NOMINATED:

TABLE 1: QUANTITY OF METHYL NOMINATED

Year	NOMINATION AMOUNT
2014	**415,067 kg**

NOMINATING PARTY CONTACT DETAILS:

Contact Person:	Federico San Martini, Ph.D.
Title:	Foreign Affairs Officer
Address:	Office of Environmental Policy U.S. Department of State 2201 C Street, N.W. Room 2657 Washington, D.C. 20520 U.S.A.
Telephone:	(202) 647-3819
Fax:	(202) 647-1052
E-mail:	SanMartiniFM@state.gov

Following the requirements of Decision IX/6 paragraph (a)(1) The United States of America has determined that the specific use detailed in this Critical Use Nomination is critical because the lack of availability of methyl bromide for this use would result in a significant market disruption. . ■ Yes ☐ No

____________________ ____________________ ____________

Signature Name Date

Title: ____________________________________

(Details on this page are requested under Decision Ex. I/4(7) for posting on the Ozone Secretariat website under Decision Ex. I/4(8).)

This form is to be used by holders of single-year exemptions to reapply for a subsequent year's exemption (for example, a Party holding a single-year exemption for 2005 and/or 2006 seeking further exemptions for 2007). It does not replace the format for requesting a critical-use exemption for the first time.

In assessing nominations submitted in this format, TEAP and MBTOC will also refer to the original nomination on which the Party's first-year exemption was approved, as well as any supplementary information provided by the Party in relation to that original nomination. As this earlier information is retained by MBTOC, a Party need not re-submit that earlier information.

CONTACT OR EXPERT(S) FOR FURTHER TECHNICAL DETAILS:

Contact/Expert Person:	Jack Housenger
Title:	Director
Address:	Biological and Economic Analysis Division Office of Pesticide Programs U.S. Environmental Protection Agency 1200 Pennsylvania Avenue, N.W. Mailcode 7503P Washington, D.C. 20460 U.S.A.
Telephone:	(703) 308-8200
Fax:	(703) 308-7042
E-mail:	Housenger.Jack@epa.gov

LIST OF DOCUMENTS SENT TO THE OZONE SECRETARIAT IN OFFICIAL NOMINATION PACKAGE:

1. PAPER DOCUMENTS: **Title of paper documents and appendices**	**No. of pages**	**Date sent to Ozone Secretariat**
2. ELECTRONIC COPIES OF ALL PAPER DOCUMENTS: ***Title of each electronic file (for naming convention see notes above)**	**No. of kilobytes**	**Date sent to Ozone Secretariat**
USA CUN14 SOIL STRAWBERRY FRUIT		

* Identical to paper documents

METHYL BROMIDE CRITICAL USE RENOMINATION FOR PREPLANT SOIL USE (OPEN FIELD OR PROTECTED ENVIRONMENT)

STRAWBERRY FRUIT

1. SUMMARY OF THE NEED FOR METHYL BROMIDE AS A CRITICAL USE

This nomination is for the critical use of methyl bromide for the production of strawberries in California (Table 1). Use of methyl bromide has been reduced over the years. For many production areas, use of 1,3-D/chloropicrin formulations with low permeable tarps and standard cultural practices (e.g. such as crop rotation, cover crop, cultivar selection, etc.) are effective for managing an array of pests with comparable yields compared to methyl bromide (e.g., Fennimore and Ajwa, 2011). An economic analysis (see Tables 3 and 4) indicates fumigant-treated soils can result in gains or losses to net revenue that range from +10% (with Pic-Clor 60 (1,3-dichloropropene with chloropicrin)) to -9% (with methyl iodide/chloropicrin), based on the cost of the individual fumigant.

California growers have a critical need for methyl bromide to treat fields where the primary alternative, 1,3-D/chloropicrin, cannot be used due to township caps restricting the total amount of 1,3-D that can be used (Fennimore and Ajwa, 2011) or where diseases caused by *Macrophomina* and *Fusarium* cannot be managed effectively (Ajwa, personal communication, email 11/7/11). Methyl iodide (iodomethane, Midas®) was registered in California in December 2010. To date, it has only been used on a few acres throughout California and only a few of those acres have been for strawberry production. This is likely due to cost concerns and to fear by growers that the public will perceive that the methyl iodide fumigation is unsafe and that strawberries are unsafe if they have been produced on methyl iodide-treated land.

The U.S. Government (USG) has reviewed all factors preventing the transition away from the use of methyl bromide in this sector. This assessment determines, the amount nominated for this sector. For the area covered in this nomination, the USG believes that the narrative discussion included in this document is accurate. The USG has nominated amounts of methyl bromide based only on those sub-sectors that cannot transition away from methyl bromide at the accelerated rate.

2. SUMMARIZE WHY KEY ALTERNATIVES ARE NOT FEASIBLE

1,3-D/Chloropicrin Treatments

Efficacy and yield with 1,3-D formulations has been shown to be comparable to methyl bromide where maximum label rates are permitted. Regulatory restrictions may reduce the overall adoption of 1,3-D or chloropicrin treatments to strawberry production land (Fennimore and Ajwa, 2011). However, methods being studied such as use of totally impermeable films (e.g., Fennimore and Ajwa, 2011) and low permeable films with carbonation (in Florida) of 1,3-D/chloropicrin formulations (e.g., Thomas et al., 2011b) can reduce the use rate of 1,3-D while providing acceptable yields and pest management allowing for more hectares to be treated with the same amount of 1,3-D.

California extension specialists have observed that some fields with a history of non-methyl bromide fumigant use have become infested with *Macrophomina* and *Fusarium* pathogens (Koike, 2008). Anecdotal information has indicated that the disease has not occurred in fields routinely treated with methyl bromide. Such fields may require methyl bromide to "clean-up" those areas. Preliminary field trials have indicated that 1,3-D provides comparable efficacy and yield to methyl bromide treatments. Those studies compared drip application of 1,3-D and methyl bromide and it is unclear if this application method provides commercially acceptable yields (see the following section). Further research is planned on the effectiveness of broadcast application of 1,3-D on *Macrophomina* and *Fusarium*, as well as the use of carbonation, totally impermeable films, and other alternatives, including non-fumigant measures.

Shank vs. Drip Application Methods

Drip irrigation of 1,3-D may not successfully manage *Macrophomina* and *Fusarium* (Ajwa, personal communication, email 11/7/11). According to Ajwa, growers in Ventura and Oxnard are shifting back to shank fumigation with methyl bromide/chloropicrin because drip fumigation did not control *Macrophomina* and *Fusarium*. In Ventura/Oxnard, drip fumigation dropped from 55% of the acreage in 2009 to 30% in 2010. In 2011, drip fumigation was used on less than 25% of the strawberry acreage. One researcher was unable to find any grower with whom he could set up drip research in 2011. In 2008, for all California strawberry land, over 55% used drip irrigation (UC Pest Management Guidelines, 2008). No information was provided concerning the efficacy of shank applied 1,3-D in comparison to methyl bromide. In Florida, shank-applied 1,3-D (as Telone® C35) provided significantly greater yields compared to methyl bromide shank fumigation (Noling and Cody, 2011). Further research should be able to validate these findings for California conditions.

Methyl Iodide Treatments

Methyl iodide is registered in California and could help to relieve township cap overages of 1,3-D. While California currently requires a larger buffer zone than for methyl bromide, the federal buffer zones will increase for most fumigants beginning in 2013. Research with methyl iodide generally indicates acceptable efficacy and yields compared to grower standards, and has shown good results at rates 40% lower than methyl bromide (e.g., Othman et al., 2011).

However, methyl iodide cannot be a viable replacement for methyl bromide or alleviate 1,3-D township caps unless it is actually used by growers as a soil treatment. As of this writing, methyl iodide has been used commercially on a very few hectares of strawberry in California. There are two likely explanations for its lack of adoption in spite of what field trials indicate is an effective fumigant. The cost of methyl iodide is first possible explanation. Methyl iodide is more expensive than methyl bromide when used to treat infested fields at a rate considered effective (300 lb, 67/33 formulation). However, many areas may not require such high rates. For those areas, the cost of methyl iodide at lower rates (200 lb, 67/33 formulation) appears to be comparable in both cost and efficacy to methyl bromide (used at higher rates) and other alternatives, including 1,3-D/chloropicrin.

The second explanation for the lack of adoption of methyl iodide is a campaign by some groups to question the safety of methyl iodide. A letter from 38 members of the California Assembly to

EPA Administrator Jackson and then Assistant Administrator Owens urged the suspension of the registration for methyl iodide pending a review of its safety (http://www.panna.org/sites/default/files/Monning%20Letter%20to%20USEPA%20re_%20registration%20of%20methyl%20iodide.pdf, April 4, 2011; CA Assembly Letter, 2011).

A "Safe Strawberry" campaign addressed to retail food outlets has suggested that consumers will be wary of buying fruit from their stores if it has been grown on soil fumigated with methyl iodide. For example, Californians for Pesticide Reform attached a survey to *Raley's Family of Fine Stores* suggesting that the manager "document Raley's progress towards offering your customers Safe Strawberries by filling out the enclosed survey…" (Letter from CPR to Mr. John Holder, Produce Manager, July 20, 2011). A local branch of Planned Parenthood issued "its first-ever environmental action alert" urging its members to call the governor of California to ban methyl iodide (Rubin, 2011).

As a result of these efforts, according to the CSC, growers who might have been willing to use methyl iodide for pest management are not willing to use it in the current political climate and risk the perception that their fruit is "tainted".

Steam Treatments

Steam appears to have the potential to be an effective soil treatment (Fennimore et al., 2011b) and has potential to replace methyl bromide for sensitive areas, such as buffer zones near schools and houses. Currently steam treating soil is a slow process. Technologies adapted to strawberry production are being examined and revised. Steam application by traditional pipe and hose methods are expensive. Blending soil with steam improves heat distribution in the soil. Use of steam in substrate production may allow recycling of substrate, which would save on costs. Automatic steam systems should be more cost-effective. The addition of mustard seed meal may increase steam efficiency. Future work will attempt to maximize applicator efficiency (e.g., Fennimore et al., 2011d).

Anaerobic Soil Disinfestation (ASD) Treatments

ASD has been successfully implemented by organic vegetable producers in Florida (Rosskopf et al., 2011) and is being investigated for strawberry production in Florida and California. ASD research (e.g., Shennan et al., 2011; Daugovish et al., 2011b; Shennan et al., 2010) has shown consistently good *Verticillium dahliae* suppression and yields comparable to methyl bromide treatments and other chemical fumigants. What is yet to be determined through additional research is 1) whether ASD will acceptably manage *Macrophomina* and *Fusarium*, 2) whether it can be used on full-field production acreage, and 3) whether it is an economically feasible treatment. Currently, some costs may be higher for ASD due to apparently lower yields than the methyl bromide standard (Klonsky et al., 2011). Results in Florida indicate that solarization may have to be combined with ASD for acceptable weed control where high infestation is likely (Rosskopf et al., 2011). USDA is currently funding studies on ASD to answer these questions (e.g., Butler et al., 2011; Louws et al., 2011).

Resistant Cultivars

Some breeding lines show resistance to *Macrophomina* or *Fusarium* (Daugovish et al., 2011a). Some available cultivars appear to exhibit negative cross-resistance—Chandler, Seascape, Monterey, San Andreas, and Ventana are resistant to one pathogen, but susceptible to the other. Drip-applied fumigants that were tested on the Camarosa cultivar (including methyl bromide, methyl iodide, chloropicrin—high and low rates, and Pic-Clor 60) resulted in comparable yields in the presence of *Macrophomina*; the untreated control had a 28% reduced yield in comparison.

Substrate System

Research into amending soil in beds or using non-soil substrates may be both biologically and economically feasible as production systems are developed (Fennimore et al., 2011a; Fennimore et al., 2011c). Results of the latest research (Thomas et al., 2011a) indicate advantages include 1) starting with disease-free growing media, 2) efficient management of water, nutrients, and runoff, and 3) yields competitive with grower standards. Currently, however, the process is labor intensive, there is a complex fertigation system, and high costs associated with non-soil substrates, growers must adopt a different 4 row bed system (instead of 2 row system), and adjustments must be made to fertilizer injectors and other equipment. Research is continuing to try to reduce costs and scale-up for commercial use.

Dimethyl Disulfide (DMDS)

DMDS is registered for use in strawberries, although not in California. Consequently, it is not a viable alternative to methyl bromide for consideration. For areas with a DMDS registration, it appears to offer comparable yields and pest management options compared to methyl bromide (e.g., Othman et al., 2011; Noling, 2010; Freeman and McAvoy, 2011).

3. IS THE USE COVERED BY A CERTIFICATION STANDARD?

There is no certification standard for strawberry fruit production.

4. PROPORTION OF CROP USING METHYL BROMIDE

TABLE 2. PROPORTION OF CROP USING METHYL BROMIDE AS A CRITICAL USE

REGION WHERE METHYL BROMIDE USE IS REQUESTED	TOTAL CROP AREA[1] (HA)	AREA NOMINATED[2] FOR METHYL BROMIDE USE IN 2014 (HA)	PROPORTION OF TOTAL CROP AREA TO BE TREATED WITH CUE METHYL BROMIDE (%)
California	15,116	2442	16

[1] California Strawberry Commission Estimate (http://www.calstrawberry.com/commission/asurvey.asp)

[2] Based on the amount of methyl bromide nominated for the 2014 use season for strawberry fruit production.

5. IF PART OF THE CROP AREA IS TREATED WITH METHYL BROMIDE, INDICATE THE REASON WHY METHYL BROMIDE IS NOT USED IN THE OTHER AREA, AND IDENTIFY WHAT ALTERNATIVE STRATEGIES ARE USED TO CONTROL THE TARGET PATHOGENS AND WEEDS WITHOUT METHYL BROMIDE THERE.

There still remains production land that is unable to be treated with 1,3-D due to township cap restrictions. Chloropicrin also has county restrictions. Currently, 1,3-D with chloropicrin is the most feasible alternative to methyl bromide. However, where township cap restrictions limit the use of 1,3D, other chemical fumigants such as methyl iodide with chloropicrin and chloropicrin alone are available for land where other regulatory restrictions do not limit their use (e.g., caps on maximum use rate or buffer restrictions). Non-chemical methods that are being examined appear to offer great possibilities including ASD, steam, and non-soil substrates. These have not been tested on a commercial-scale as of yet. In addition, to manage diseases caused by *Macrophomina* and *Fusarium,* breeding efforts are underway to identify lines that show resistance to both pathogens.

Research has indicated that with the use of totally impermeable films, drip-applied 1,3-D/chloropicrin formulations (Telone C-35 with 63% 1,3-D) at 200 lb per acre (225 kg per ha) is as effective in terms of yield and weed control as a standard methyl bromide treatment (Fennimore and Ajwa, 2011). This can lower the amount of 1,3-D by 33% below the rate typically used with standard films and, therefore, may result in reducing the burden of caps that restrict the overall amount of 1,3-D used in a township. Pic-Clor 60 is formulated with lower rates of 1,3-D (39% 1,3-D) and has been effective in field trials, but chloropicrin restrictions are also in place in some counties and reduce its use. These research trials did not address issues associated with *Macrophomina* or *Fusarium*.

Carbonation of 1,3-D/chloropicrin formulations may help to reduce the overall use of 1,3-D by increasing its dispersal in the soil while providing yields comparable to methyl bromide (Thomas et al., 2011b). In Florida trials (Noling and Cody, 2011) "most alternative fumigants evaluated produced yields which were statistically equivalent to that of methyl bromide chloropicrin 50/50 (320 lb/[treated] acre). Coformulated fumigants such as Telone C-35, generally performed better than that of Pic-Clor 60 for maintaining strawberry crop productivity and nematode control."

6. WOULD IT BE FEASIBLE TO EXPAND THE USE OF THESE METHODS TO COVER AT LEAST PART OF THE CROP THAT HAS REQUESTED USE OF METHYL BROMIDE? WHAT CHANGES WOULD BE NECESSARY TO ENABLE THIS?

Expansion of alternative methods (described in Section 2, above) to areas currently considered critical for methyl bromide will occur and effective alternatives are available. Factors that may affect farmer transition to alternatives include regulatory restrictions, perception of the consequences of methyl iodide use, results of the effectiveness of non-fumigant technologies, and remedies to biological issues, such as the emergence of *Macrophominia phaseolina* and *Fusarium oxysporum* as major pests in some areas.

The California Strawberry Commission and University of California Extension have continued to support and fund the "Farming-Without-Fumigants Initiative" whose goal is to develop strawberry fruit production methods that eliminates the need for fumigants all together (Legard, 2011). Numerous reports on such research were presented at the 2011 Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions. Results of these studies highlight the promising potential for alternatives to methyl bromide, including non-chemical alternatives. Technologies such as steam (Fennimore, 2011b), soilless production with substrates and landscape fabrics (Thomas et al., 2011a; Cabrera et al., 2011), cultivar selection (Daugovish et al., 2011a), buffer zone management (Daugovish et al., 2011c), anaerobic soil disinfestations (Daugovish et al., 2011b; Shennan et al., 2011; Rosskopf et al., 2011), biofumigation (Mazzola, 2011), and innovative applications pesticides (Sances et al., 2011; Daugovish and Fennimore, 2011; Thomas et al., 2011b). Transition from methyl bromide is expected to continue with the refinement of these new technologies being funded by USDA nationwide. For example, the University of Florida will be completing research on carbonation of fumigants such as Telone to enable greater depth penetrations and lateral dispersion in order to limit the time for reinfestation by nematodes (Thomas et al., 2011c). This effort will also evaluate the use of low-permeable tarps to increase efficacy and reduce emissions. The University of Florida will also complete large-scale demonstration trials and industry-wide testing on the use of two drip tapes per plant bed in the spring and or fall with Telone (Noling and Cody, 2011).

7. ECONOMIC FEASIBILITY OF ALTERNATIVES

Net revenue is calculated here as gross revenue minus operating costs. This is known as a partial budget analysis and is a good measure that can be used to describe the direct losses of income that may be suffered by the users. The net revenue presented here does not represent net income to the users. Net income, which is an indication of the profitability of an operation of an enterprise, is gross revenue minus the sum of operating and fixed costs. Net income should be smaller than the net revenue measured in this study. Fixed costs were not included because they are often difficult to measure and verify.

Summary of Economic Feasibility

The economic analysis of strawberry fruit production compared data on yields, crop prices, revenues and costs using methyl bromide and using alternative pest control regimens in order to estimate the loss of methyl bromide availability. For California, the primary alternative is 1,3-D/Chloropicrin at 33 gallons per acre or chloropicrin at 300 pounds per acre where it is allowed.

The economic factors that drive the feasibility analysis for the use of methyl bromide for fresh market strawberry fruit are increased production costs, which may be due to the higher-cost of using an alternative, additional pest control requirements, and/or resulting shifts in other production or harvesting practices and yield losses. The feasibility of alternatives as compared to methyl bromide is dependent on maintaining yield and fruit quality at a competitive cost. An economic analysis (see Tables 3 and 4) indicates fumigant-treated soils can result in gains or losses to net revenue that range from +10% (with Pic-Clor 60 (1,3-D plus chloropicrin)) to -9% (with methyl iodide, 67:33), based primarily on the cost of the individual fumigant.

Crop budgets were analyzed for pre-plant sectors to determine the likely economic impact if methyl bromide were unavailable. Various measures were used to quantify the impacts, including the following:

(1) **Loss per Hectare.** For crops, this measure is closely tied to income. It is relatively easy to measure, but may be difficult to interpret in isolation.

(2) **Loss per Kilogram of Methyl Bromide**. This measure indicates the value of methyl bromide to crop production.

(3) **Loss as a Percentage of Gross Revenue.** This measure has the advantage that gross revenues are usually easy to measure, at least over some unit, *e.g.*, a hectare of land or a storage operation. However, high-value commodities or crops may provide high revenues but may also entail high costs. Losses of even a small percentage of gross revenues could have important impacts on the profitability of the activity.

(4) **Loss as a Percentage of Net Operating Revenue**. Net cash revenues are defined as gross revenues minus operating costs. This is a very good indicator of the direct losses of income that may be suffered by the owners or operators of an enterprise. However, operating costs can often be difficult to measure and verify.

(5) **Operating Profit Margin**. Operating profit margin is defined as net operating revenue divided by gross revenue per hectare. This measure would provide the best indication of the total impact of the loss of methyl bromide to an enterprise. Again, operating costs may be difficult to measure and fixed costs even more difficult, therefore fixed costs were not included in the analysis.

These measures represent different ways to assess the economic feasibility of methyl bromide alternatives for strawberry fresh fruit producers. Because producers (suppliers) represent an integral part of any definition of a market, the threshold of significant market disruption is met if there is a significant impact on commodity suppliers using methyl bromide. These economic measures provide the basis for making that determination.

The analysis presented in Tables 3 and 4 below compares different fumigation and steam treatment costs to the cost of treating with methyl bromide. Table 3 compares methyl bromide and broadcast alternatives impacts while Table 4 compares methyl bromide to steam and drip alternatives for California strawberry fruit growers. Costs consist of all production costs including labor, equipment and material. Yield losses were assumed to be zero based on the lack of publically verifiable yield loss data associated with methyl bromide alternative treatments. In the areas where the alternatives can be used California strawberry producers are not expected to suffer significant impacts if methyl bromide were not available. Currently, growers are using Pic-Clor 60 in both broadcast and drip applications with no measurably known decrease in net revenue.

Iodomethane is registered for use, but there are several impediments for its use by growers, primarily due to the public's concern about methyl iodide's safety (see Section 2, above). Iodomethane may be used in combination with chloropicrin in a 67/33 formulation at a rate of 224 kg/ha. To date, about 10-15 acres of methyl iodide have been applied in total in California. Iodomethane is more expensive than Pic-Clor 60 and chloropicrin if used in a broadcast application. The drip application of methyl iodide appears to be profitable, but this assessment does not take into account the cost of the negative perception issues described above. See Tables

3 and 4 below for the 2011 comparison of methyl iodide to methyl bromide in the economic impact assessment for California strawberry fruit growers.

Steam is another promising alternative, but the costs that are presented below are based on small plots (10 acres or less) and, therefore, steam may not be available for use on a commercial scale in the near future. The cost of fuel is the primary driver for the cost of steam. Current diesel prices in California average around $4.20 per gallon as quoted by Pricelock.com on October 13, 2011 (www.pricelock.com/index). See Table 4 below.

TABLE 3. CALIFORNIA: ECONOMIC IMPACTS OF METHYL BROMIDE BROADCAST ALTERNATIVES

CALIFORNIA FRESH STRAWBERRY	METHYL BROMIDE + PIC 50/50	1,3 D + PIC @33GPA	IODOMETHANE + PIC 67/33 @ 200	IODOMETHANE + PIC 67/33 @ 300	CHLORPICRIN @300 LB/A
PRODUCTION LOSS (%)	0%	0%	0%	0%	0%
PRODUCTION PER HECTARE (KG/HA)	79,074	79,074	79,074	79,074	79,074
**PRICE PER UNIT (US$)	$ 2.51	$ 2.51	$ 2.51	$ 2.51	$ 2.51
= GROSS REVENUE PER HECTARE (US$)	$ 198,734	$ 198,734	$ 198,734	$ 198,734	$ 198,734
- OPERATING COSTS PER HECTARE (US$)**	$ 164,990	$ 163,754	$ 165,607	$ 168,078	$ 164,248
= NET REVENUE PER HECTARE (US$)	$ 33,744	$ 34,980	$ 33,126	$ 30,655	$ 34,485
	*LOSS MEASURES *				
1. LOSS/GAIN PER HECTARE (US$)	$0	$ 1,236	($ 618)	($ 3,089)	$ 741
2. LOSS/GAIN PER KILOGRAM OF METHYL BROMIDE (US$)	$0	$ 7.27	($ 3.63)	($ 18.17)	$ 4.36
3. LOSS/GAIN AS A PERCENTAGE OF GROSS REVENUE (%)	0%	1%	0%	-2%	0%
4. LOSS/GAIN AS A PERCENTAGE OF NET OPERATING REVENUE (%)	0%	4%	-2%	-9%	2%
5. OPERATING PROFIT MARGIN (%)	17%	18%	17%	15%	17%

**Note that the measures in the tables above must be interpreted carefully. Operating costs do not include fixed costs and net revenue equals gross revenue minus operating costs. Values may not calculate due to rounding during conversion from $/lb to $/kg.

TABLE 4. CALIFORNIA: ECONOMIC IMPACTS OF METHYL BROMIDE STEAM AND DRIP ALTERNATIVES

CALIFORNIA FRESH STRAWBERRY	METHYL BROMIDE + PIC 50/50	STEAM	PIC-CLOR 60 EC 25 GPA	MIDAS EC @ 140 LB/A IODOMETHANE + PIC
PRODUCTION LOSS (%)	0%	0%	0%	0%
PRODUCTION PER HECTARE (KG/HA)	79,074	79,074	79,074	79,074
**PRICE PER UNIT (US$)	$ 2.51	$ 2.51	$ 2.51	$ 2.51
= GROSS REVENUE PER HECTARE (US$)	$ 198,734	$ 198,734	$ 198,734	$ 198,734
- OPERATING COSTS PER HECTARE (US$)**	$ 164,990	$ 165,434	$ 161,283	$ 163,260
= NET REVENUE PER HECTARE (US$)	$ 33,744	$ 33,299	$ 37,451	$ 35,474
	*LOSS MEASURES *			
1. LOSS/GAIN PER HECTARE (US$)	$0	($445)	$ 3,459	$ 1,730
2. LOSS/GAIN PER KILOGRAM OF METHYL BROMIDE (US$)	$0	($ 2.62)	$ 20.35	$ 10.17
3. LOSS/GAIN AS A PERCENTAGE OF GROSS REVENUE (%)	0%	0%	2%	1%
4. LOSS/GAIN AS A PERCENTAGE OF NET OPERATING REVENUE (%)	0%	-1%	10%	5%
5. OPERATING PROFIT MARGIN (%)	17%	17%	19%	18%

**Note that the measures in the tables above must be interpreted carefully. Operating costs do not include fixed costs and net revenue equals gross revenue minus operating costs. Values may not calculate due to rounding during conversion from $/lb to $/kg.

8. RESULTANT CHANGES TO REQUESTED EXEMPTION QUANTITIES

The USG has applied a transition rate to the alternatives, which is reflected in the nomination amount and detailed in Table 5. The amount requested reflects adjustments for areas with high pest pressure, 1,3-dichloropicrin (Telone™) township caps, local regulatory restrictions on the use of chloropicrin, and the impact of buffer distances on the use of iodomethane.

TABLE 5. NOMINATION AMOUNT:

2014 Methyl Bromide Usage Newer Numerical Index Transition Use Reduction Description Spreadsheet			
SECTOR		STRAWBERRY FRUIT	
		California Strawberry Commission	Sector Total
Quantity Requested for 2013:	Amount (kgs)	531,737	531,737
Quantity Recommended by MBTOC/TEAP for 2013 :	Amount (kgs)	461,186	461,186
Quantity Authorized by Parties for 2013:	Amount (kgs)	461,186	461,186
	Area (ha)	2,713	
	Rate	170	
Transition from 2014 Baseline Adjusted Value	Percentage (%)	-10%	
Quantity Required for 2014 Nomination:	Amount (kgs)	**415,067**	**415,067**
	Area (ha)	**2,442**	
	Rate	**170**	

9. CITATIONS

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Cabrera, J. A., Wang, D., Gerik, J., and Gan, J. 2011. Effects of landscape fabrics on pest control in a raised-bed trough system for strawberry production without fumigation. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). http://mbao.org/2011/Proceedings/05CabreraAStrawberryfabrics.pdf

Daugovish, O. and Fennimore, S. 2011. S-Metolachlor (Dual magnum) safety for strawberry in southern California. International Research Conference on Methyl Bromide Alternatives and Emissions Reductions (2011). http://mbao.org/2011/Proceedings/78DaugovishODualMagnum.pdf

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